REMARKS

Claims 1-22 are all the claims pending in the application. Reconsideration and allowance of all the claims are respectfully requested in view of the following remarks.

Election/Restriction

The Examiner acknowledged Applicant's election, without traverse, of claims 11-22. Accordingly, claims 1-10 have been withdrawn from consideration.

Specification

- The Examiner objected to the disclosure as including informalities. The Examiner noted specific instances of informality on pages 23, 26, 30, and 32.[1] Applicant has corrected these, and other, informalities throughout the specification.

- The Examiner asserted that the title of the invention is not descriptive, and required a new title.[2] Applicant has amended the title to remove the reference to the method, which is the subject of non-elected claims 1-10.

Claim Rejections - 35 U.S.C. § 112

- The Examiner rejected claims 14, 16, and 17-20 under §112, 2nd paragraph, as indefinite. In response to this rejection, Applicant respectfully traverses it in part, and has amended in part, as set forth below.

The Examiner asserted that "said top surface" as set forth in claims 14 and 17 lacks antecedent basis. With respect to claim 14, Applicant respectfully traverses this rejection because there is, indeed, sufficient antecedent basis. In claim 12, from which claim 14 depends, lines 16-17 set forth "a top surface". On the other hand, with respect to claim 17, Applicant has amended this phrase to "a top surface", thereby setting forth this element for the first time.

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[1] Office Action at page 2, item 2.

[2] Office Action at page 2, item 3.

The Examiner asserted that "said sintering mold", as set forth in claim 16 lacks antecedent basis. Applicant has amended this phrase to read "said mold" as used throughout the claims.

With respect to claim 19, the Examiner asserted that the recitation of "said hopper" and "said at least one hopper" is confusing. Applicant has amended, in claim 19, all references to the hopper to read "said at least one hopper" as was set forth in claim 17 from which claim 19 depends.

With respect to claim 20, the Examiner asserted that the term "may be" is indefinite. Applicant has amended this phrase to "is capable of".

Claim Rejections - 35 U.S.C. § 102

- The Examiner rejected claim 11 under §102(b) as being anticipated by US Patent 5,362,434 to Hauser et al. (hereinafter Hauser '434). Applicant respectfully traverses this rejection because Hauser '434 fails to disclose every element as set forth and arranged in Applicant's claim.

Claim 11 sets forth an apparatus for automatically loading a desired amount of powder material into a tubular mold, comprising: a mold conveyor system for supporting and conveying the mold with a lower press core fitted therein; a powder filling mechanism for filling an amount of powder material into the mold; and a press unit for pressing the amount of powder material in the mold, wherein the mold in which the desired amount of powder compact is loaded is conveyed out of the powder filling position and a new mold with no powder material being loaded is conveyed to the powder filling position.

The apparatus according to claim 11 is, in particular, usable for loading a desired amount of powder material into an annular mold for sintering the powder material using the annular mold itself. In order to obtain a compact, entirely sintered product, it is necessary to load the powder material into a mold evenly, and to then press the powder material to compact it. This requirement is achieved by the apparatus recited in claim 11.

Moreover, according to the apparatus claimed in claim 11, a mold in which no powder material is loaded is conveyed to a position (powder filling position) of a powder filling mechanism, and the mold is then loaded with a desired amount of powder material and conveyed from the filling position to another position. Thereafter, a new mold in which no powder material is loaded is conveyed to the filling position of a powder filling mechanism.

It is not clear, from the description of Hauser '434, as to whether or not a mold shell 26 is carried out of the position shown in Fig. 2 after powder material in the mold shell 26 is compressed by a pair of pistons and a new mold shell with no powder material being loaded is carried to that position. However, it appears that in the vertical press of Hauser '434, as shown in Fig. 2, that only one mold shell which has been placed in position is used and powder material loaded into the mold shell is pressed by a pair of pistons 7 and 17; thereafter a molded body formed in the mold shell 26 is pushed out of the mold shell and is conveyed out of the position by a belt conveyor shown adjacent the right side of the mold shell. And any ambiguity in the reference is to be construed against the Examiner.[3] Accordingly, Hauser '434 fails to disclose that a mold in which the desired amount of powder compact is loaded is conveyed out of the powder filling position and a new mold with no powder material being loaded is conveyed to the powder filling position.

For at least any of the above reasons, claim 11 is not anticipated by Hauser '434.

- The Examiner rejected claims 20-22 under §102(b) as being anticipated by US Patent 3,887,317 to Plocher et al. (hereinafter Plocher). Applicant respectfully traverses this rejection because Plocher fails to disclose every element as set forth in Applicant's claims.

Claim 20 sets forth a powder filling mechanism for filling powder material into a mold which has a bore opening at a top end thereof, the mechanism comprising: a support plate having a top surface and a hole sized to receive the upper end of the mold, wherein the upper end of the mold is capable of fitting in the hole without any substantial clearance therebetween and with the

[3] See *In re Robertson*, 49 U.S.P.Q.2d 1949 (Fed. Cir. 1999).

top surface of the support plate and a top surface of the mold being substantially flush with each other; a hopper; and a bottom opening in the hopper, wherein the hopper is movable on the top surface of the support plate and across the top surface of the mold.

In contrast to that set forth in claim 20, Plocher discloses a die table 32 having an opening 34 that is sized to the final shape of the product to be made. Further, opening 34 includes a bottom punch 36 therein, which mates with upper punch 38 to form the product within the opening 34. Thus, opening 34 comprises the mold, it is not sized to receive an upper end of a mold, as set forth in claim 20.

Claim 22 sets forth that the hopper is movable between first and third positions at which a bottom opening of the hopper is closed, wherein the hopper passes a second position during a stroke between the first and third positions, at which the bottom opening of the hopper is in alignment with a hole in the support plate, whereby powder filling is completed by a single stroke of the hopper from one of the first and third positions to the other.

For example, as shown in Figs. 9 and 10, one embodiment of the invention comprises an arrangement wherein the hopper 150 is movable between first (on the left side of the figs.) and third (the right side of the figs.) positions wherein the opening of the hopper is closed. During a stroke from either the left to the right, or the right to the left, the hopper 150 passes a second position wherein its bottom is in alignment with opening 141a in support plate 141 so that powder filing is completed by a single stroke.

In contrast to that in claim 22, Plocher discloses that the hopper 58 and associated charging shoe 40 are moved from the bottom of Fig. 4 to the top, and back again, in order to fill the opening 34 with powder. See also col. 4, clines 50-61, wherein Plocher describes the movement of the charging shoe as being "off its guideway 50 and back again into the guideway." Thus, Plocher fails to disclose that powder filling is completed by a single stroke, as set forth in claim 22.

Claim Rejections - 35 U.S.C. § 103

- The Examiner rejected claims 12, 14, 17, and 18, under §103(a) as being unpatentable over Hauser '434 in view of US Patent 4,373,888 to Yamamoto (hereinafter Yamamoto). Applicant respectfully traverses this rejection because the references fail to establish *prima facie* obviousness in that there is no motivation for combining them as suggested by the Examiner.

"It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious." *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ.2d 1780, 1784 (Fed. Cir. 1992)(citing *In re Gorman*, 933 F.2d 982, 987, 18 USPQ.2d 1885, 1888 (Fed. Cir. 1991)).

Further, every element of a claimed invention may often be found in the prior art. *Id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. *Id.* Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant. *In re Kotzab*, 55 USPQ2d at 1316 (*citing In re Dance*, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998); and *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)).

Here, the Examiner asserts that one of ordinary skill in the art looking at Yamamoto would have been motivated to provide the scraping device therein to the device of Hauser '434 to scrape off the excess material from the mold surface. However, Yamamoto does not provide any motivation for making the Examiner's suggested modification of Hauser '434. Instead, Yamamoto teaches a dry lubricant dispensing system wherein the dispensing of lubricant can be readily controlled, and evenly adhered to the working surfaces of the punches as well as the inner surfaces of the die cavities.[4]

[4] Yamamoto at col. 2, lines 25-40, and col. 4, lines 44-57.

Therefore, one of ordinary skill in the art looking at the references as a whole would have been motivated to provide Hauser '434 with a dry lubricant dispensing system as taught by Yamamoto; he would not have been taught to provide Hauser '434 with a strickle mechanism.

For the above reasons, Hauser '434 and Yamamoto fail to render obvious claims 12, 14, 17, and 18. With respect to claims 12 and 14 Applicant respectfully traverses this rejection for the following additional reason that the references fail to teach or suggest every element as set forth and arranged therein.

Claim 12 sets forth an apparatus for automatically loading a desired amount of powder into a mold, wherein a mold conveyor system comprises a guide rail, a carrier movable along the guide rail and capable of supporting a lower press core, wherein a powder filling mechanism comprises a hopper located above a transportation path of the carrier.

The Examiner asserts that Hauser '434 discloses a movable carrier 4,5 and a movable filling mechanism 30-36.[5] But in contrast to that set forth in claim 12, Hauser '434 discloses that both the elements 4 and 5, as well as the elements 30-36, move along the guide rails 10, 10', i.e., they move along the same path. Thus, Hauser '434 fails to teach or suggest that a hopper is located above a transportation path of a mold carrier. Further, Yamamoto fails to teach or suggest any such feature. Therefore, *arguendo*, even assuming one of ordinary skill in the art were motivated to combine the references as suggested by the Examiner, any such combination would still not include a mold conveyor system comprising a guide rail, and a carrier movable along the guide rail and capable of supporting a lower press core, wherein a powder filling mechanism comprises a hopper located above a transportation path of the carrier, as set forth in Applicants' claims 12 and 14.

- The Examiner rejected claim 16 under §103(a) as being unpatentable over Hauser '434 in view of US Patent 5,433,903 to Hauser (hereinafter Hauser '903). Applicant respectfully

[5] Office action at page 3, item 7, 2nd and 3rd paragraphs.

traverses this rejection because the references fail to establish *prima facie* obviousness in that they fail to teach or suggest every element as set forth in the claim.

Claim 16 sets forth an apparatus for automatically loading a desired amount of powder material into a mold, comprising a measure unit for measuring the weight of the mold with the amount of powder material filled into the mold. That is, the measure unit of claim 16 measures weight.

The Examiner notes that Hauser '434 fails to disclose a weight measuring device.[6] Further, the Examiner asserts that Hauser '903 discloses a weight-measuring unit 10.[7] But the Examiner's interpretation of Hauser '903 is wrong. That is, in contrast to that set forth in claim 16, and to that asserted by the Examiner, Hauser '903 teaches the use of "a metering device 10". However, Hauser '903 does not disclose that the metering device 10 measures the weight of the material 6 that is distributed to the pressure mold 5. That is, Hauser '903 is ambiguous as to what kind of metering the device 10 performs. And any ambiguity in the reference should be construed against the Examiner. See *In re Robertson*, 49 U.S.P.Q.2d 1949 (Fed. Cir. 1999).

Therefore, *arguendo*, even assuming that one of ordinary skill in the art were motivated to combine Hauser '434 with Hauser '903, any such combination would still not teach or suggest a measure unit for measuring weight, as set forth in claim 16.

For the above reasons, claim 16 is not rendered obvious by Hauser '434 in view of Hauser '903.

- The Examiner rejected claims 12-18 under §103(a) as being unpatentable over Hauser '434 in view of US Patent 861,903 to Rosell (hereinafter Rosell). Applicant respectfully traverses this rejection because the references fail to establish *prima facie* obviousness in that Rosell teaches away from the combination suggested by the Examiner, and in that they fail to teach or suggest all of the elements as set forth in Applicant's claims.

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[6] Office Action at page 5, 1st paragraph.

[7] Office Action at page 5, 2nd paragraph.

First, Rosell teaches away from the combination suggested by the Examiner. Yet it is improper to combine references where the references teach away from their combination.[8]

The Examiner, citing to col. 1, lines 13-15, asserts that Rosell teaches a strickle mechanism. But Rosell describes such a mechanism as the prior art, and as disadvantageous. That is, Rosell states that "... the usual feeder, called a charger, drags an excess of material to be fed over the molds and afterwards drags back the excess."[9] Further, Rosell teaches that such a mechanism is "ill adapted for use on presses for compressing material, consisting principally of sand ..."[10] Thus, Rosell teaches that "[t]o avoid the objection to the two classes of existing feeders, viz., ... drag feeders, I have devised a new type of feeder in which ..."[11]

Therefore, one of ordinary skill in the art looking at the teachings of Rosell as a whole would not have been motivated to provide Hauser '434 with a drag feeder as set forth on lines 13-15 of Rosell's col. 1. Instead, if at all motivated to combine Rosell with Hauser '434, he would have been motivated to provide Rosell's frictionless feeder, not a drag feeder as in the prior art. Accordingly, any combination of Rosell and Hauser '434 would not include a strickle mechanism as set forth in Applicant's claims 12-15, 17, and 18.

Second, with respect to claim 16, these references fail to teach or suggest every element as set forth in Applicant's claim. As noted above, claim 16 sets forth an apparatus for automatically loading a desired amount of powder material into a mold, comprising a measure unit for measuring weight.

As noted by the Examiner, Hauser '434 fails to disclose a material measure unit. The Examiner then asserts that Rosell discloses a material measure unit 34. In contrast to that set forth in claim 16, and that asserted by the Examiner, however, Rosell's unit 34 does not measure

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[8] *In re Grasselli*, 713 F.2d 731, 218 USPQ 769, 779 (Fed. Cir. 1983).

[9] Rosell at p. 1, lines 12-15.

[10] Rosell at p. 1, lines 15-19.

[11] Rosell at p. 1, lines 24-29.

weight of the material. Instead, Rosell's feed rollers "deliver definite quantities of material from the hopper" by measuring volume.[12] That is, the rollers 34 have a cut-out portion as shown in Fig. 1 and, therefore measure volume, not weight.

Therefore, *arguendo*, even assuming that one of ordinary skill in the art were motivated to combine Rosell with Hauser '434 as suggested by the Examiner, any such combination thereof would still not include a measure unit for measuring weight, as set forth in claim 16.

- The Examiner rejected claim 19 under §103(a) as being unpatentable over Hauser '434 in view of Yamamoto or Rosell, and further in view of US Patent 5,603,880 to Kato et al. (hereinafter Kato). Because this rejection is based on Hauser '434 in combination with either Yamamoto or Rosell, Applicant's above-noted arguments against the combinations of Hauser '434 with Yamamoto and Rosell are pertinent here. Further, Kato fails to cure the deficiencies in the Examiner's attempted combinations of Hauser '434 with either Yamamoto or Rosell. Accordingly, Hauser '434, Yamamoto, Rosell, and Kato fail to render obvious claim 19.

Double Patenting

- The Examiner rejected claims 11, 13, and 14, under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 8-20 of US Patent 6,383,446 to Tokita (hereinafter Tokita)—Assignee is Sumitomo Coal Mining Co., Ltd. Applicant respectfully traverses this rejection because the Examiner has failed to adequately explain the rejection and, therefore, has failed procedurally to establish a case of *prima facie* obviousness.

A double patenting rejection of the obviousness-type is "analogous to [a failure to meet] the nonobviousness requirement of 35 U.S.C. § 103" except that the patent principally underlying the double patenting rejection is not considered prior art. *In re Braithwaite*, 379 F.2d 594, 154 USPQ 29 (CCPA 1967). Therefore, any analysis employed in an obviousness-type

[12] Rosell at p. 2, lines 116-118.

double patenting rejection parallels the guidelines for analysis of a 35 U.S.C. § 103 obviousness determination. *In re Braat*, 937 F.2d 589, 19 USPQ2d 1289 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985).

Accordingly, any obviousness-type double patenting rejection should make clear:

(A) The differences between the inventions defined by the conflicting claims—a claim in the patent compared to a claim in the application; and

(B) The reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim in issue is an obvious variation of the invention defined in a claim in the patent.

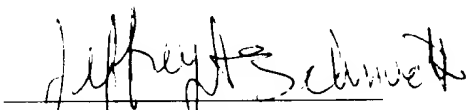
See MPEP § 804 (II)(B)(1). Because the Examiner has failed to perform both (A) and (B) above, procedurally he has failed to establish *prima facie* obviousness-type double patenting rejection.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

The title has been amended as follows:

[METHOD AND] APPARATUS FOR AUTOMATICALLY LOADING POWDER MATERIAL INTO A MOLD

IN THE SPECIFICATION:

Page 10, the fifteenth paragraph has been changed as follows:

Fig. 17 is a section view of the apparatus of Fig. 16 taken along line [V-V] W-W in Fig. 16;

The paragraph bridging pages 22 and 23 has been changed as follows:

The movable hopper 150 has a rod 154 having one end connected to the movable hopper 150 on one side (the left-hand side as viewed in Figs. 9 and 10) of the movable hopper 150 and extending parallel to the hopper guide rails 142 (i.e., in the horizontal direction as viewed in Figs. 9 and 10). The rod 154 is supported by a linear bearing 155 for sliding movement along the longitudinal direction of the rod 154, with the linear bearing 155 being fixedly mounted on the support plate 141. The rod 154 is driven for reciprocal linear motion by means of a drive motor [146] 156 and a suitable drive mechanism of a known type (not shown). The drive mechanism may be a rack-and-pinion drive comprising rack-teeth formed on the rod 154 and a pinion in engagement with the rack-teeth and driven by the drive motor [146] 156 for rotation in both directions. Such a drive mechanism may be preferably housed within the casing of the linear bearing 155. The position of the rod 154 and thus the position of the movable hopper 150 is detected by a pair of position sensors 147a and 147b, which are mounted on the support plate 141 at position spaced apart in the moving direction of the rod 154.

The paragraph bridging pages 25 and 26 has been changed as follows:

With reference again to Figs. 4 and 6, the measure unit 16 comprises: a horizontal support plate 161, which is fixedly mounted on the upper beams 113 of the frame 11 and extends

over the transportation path of the carrier 223; four bearing sleeves 162a fixedly mounted on the support plate 161; and four vertical rods 162 supported by the respective bearing sleeves 162a for vertical displacement. The four bearing sleeves 162a are provided on the support plate 161, with two of them being located at each end (each of the right- and left-hand ends as viewed in Fig. 4) of the support plate 161. The measure unit 16 further comprises: a connecting plate 163 secured to the upper ends of the vertical rods 162; a load sensor 164 secured to the support plate 161 at the middle point of the support plate 161; and a pusher 165 fixedly attached to the connecting plate 163 for pushing down the top end of the load sensor 164. Each of the vertical rods 162 has a support bar 166, which is connected at the lower end of the associated vertical rods 162 and extends horizontally toward the transportation path of the carrier 223. Vertical guide rods 167 for guiding counterweights 168 in vertical direction are fixedly connected to the support plate 161. A support bar 166 extending toward the carrier is fixed to the lower end of each of the vertical rods. The support bars 166 are connected to the counterweights 168 through cables 169, such that the total weight of the vertical rods 162, the connecting plate 163, the sintering mold and the tray is substantially balanced with the counterweights 168, in order to prevent any excessive load from acting on the [lord] load sensor 164. In operation, a sintering mold may be brought to the measuring position of the measure unit 16 each time the powder filling operation has been effected to the sintering mold. Alternatively, a sintering mold may be brought to the measuring position only when the powder filling operations for all the powder layers to be formed in the sintering mold have been done. In either case, when the sintering mold is brought to the measuring position by the carrier 233, the lift motor 239 in the carrier 223 is operated to lift down the receiving plate [130] 230. When the receiving plate [130] 230 is lifted down below the support bars 166, the sintering-mold-and-tray placed on the receiving plate [223] 230 is passed to the support bars 166. The sintering-mold-and-tray is now supported solely by the support bars 166, and the total weight of the amounts of powder materials having been filled into the sintering mold so far is measured by the load sensor 164, which excludes the weights of the vertical rods 162, the connecting plate 163, the tray J, the sintering mold al and the lower press core e. Further, from the measurements thus obtained, the weight of the amount of powder

material last filled into the sintering mold can be determined. The measurement operation may be performed either before or after the pressing operation which is described in detail below.

The paragraph bridging pages 26, 27 and 28 has been changed as follows:

With reference to Figs. 12 and 13, the press unit 18 comprises a rectangular base plate 181 which is separate from the frame 11; four upright columns 182 fixedly mounted on the base plate 181, one at each corner of the base plate 181; an upright pedestal 183 fixedly mounted on the base plate 181 at the center thereof; a top plate 184 supported by and connected to the upper ends of the columns 182; a press guide 185 guided by the columns 182 for vertical movement between the top plate 184 and the base late 181; an upper plunger or press member 186 fixedly mounted on the press guide 185; an hydraulic cylinder 187 secured to the top plate and having a piston rod 187a connected to the press guide 185. The base plate 181 is provided with a pair of guide rails (not shown) mounted thereon, the guide rails forming an elongation of the guide rails 221 mounted on the under frame members 111 of the frame 11, so that the carrier 233 may be operated to run not only along the guide rails 21 on the frame 11 but also along the guide rails on the base plate 181. The pedestal 183 has a top end 183a which is so shaped and sized as to be received in the opening 131 of the receiving plate 130 of the carrier 223 as well as in the opening H formed in the tray J. The pedestal 183 is of a hollow cylindrical shape and has a cutout 191 formed therein, as shown in Fig. [12B] 13B. The cutout 191 faces the direction from which the carrier approaches the pedestal 183 and forming a through path between the inside and the outside of the hollow cylindrical pedestal 183. When the carrier 223 has reached the pressing position of the press unit [16] 18, the cutout 191 allows a part of the carrier 233 to enter the inside space of the pedestal 183, which part includes the cylindrical stem portion of the push-up member 234, the drive motor 235, the central portion 232a of the mount plate 232 and the central portion 233a of the lift plate 233 (see Figs. 5C and 5D). Further, when the carrier 223 is in this position, the top flange 234b of the push-up member 234 extends above the top, circular edge of the pedestal 183, with the axis of the push-up member 234 and being substantially in alignment with the axis of the pedestal 183. In addition, when the carrier 223 is in this position, the pedestal 183 is received in the recess or cutout [224'] 233' formed in the lift plate [224] 233 of the carrier 223 (Figs. 5B and 5D). The upper plunger or press member 186 has a lower end so shaped and

sized as to be fitted tight in the bore b of the sintering mold al. The press unit 18 further comprises a pair of hydraulic cylinders (lift cylinders) 188 mounted on the base plate 181 through respective brackets 189 at positions on opposite sides of the pedestal 183. The hydraulic cylinders 188 are supported by the corresponding brackets 189 with their piston rods 188a extending upward. A pair of support members 190 are attached to the upper ends of the piston rods 188a, respectively.

The 1st full paragraph on page 28 has been changed as follows:

In operation, when the press unit 18 is in a condition to wait for a sintering mold to arrive, the press guide 185 having the upper plunger 186 mounted thereon is placed at its upper position by means of the hydraulic cylinder 187, while the lift cylinders 188 are controlled such that their piston rods 188a are in their retreated position. When the carrier 223 arrives at the pressing position of the press unit 18, the pedestal 183 is received in the recesses 224',232' and 233' of the [lift] base plate 224, the mount plate 232 and the lift plate 233, respectively, while the cylindrical stem portion of the push-up member 234, the drive motor 235, the central portion 232a of the mount plate 232 and the central portion 233a of the lift plate 233 together enter the inside space of the pedestal 183 through the cutout 191. When the carrier 223 has reached the pressing position, the axis of the push-up member 234 is substantially in alignment with the axis of the pedestal 183 and the top flange 234b of the push-up member 234 extends above the top edge of the pedestal 183. Then, the lift motor 239 is operated to lower the receiving plate 230 of the carrier 223 and thus lower the tray J on which a sintering mold al is placed, until the under surface of the top flange 234b of the push-up member 234 come into engagement with the top edge of the pedestal 183, when the top surface of the top flange 234b remains in contact with the bottom surface of the lower press core e fitted in the sintering mold, so that the sintering mold al is thereby supported with the lower press core e fitted therein and the amount of powder material filled therein. Then, the hydraulic cylinder 187 is operated to lower the press guide 185 and the upper plunger or press member 186 along the columns 182, so that the powder material filled into the sintering mold is pressed by the upper plunger 186 at a desired pressure and for a desired length of time.

The paragraph bridging pages 28 through 31 has been changed as follows:

When the pressing operation has been done, the powder material in the sintering mold has been more or less compacted, so that the top surface of the resultant powder compact has been sunk from the initial level, i.e., the level of the top surface c of the sintering mold. This sinkage can be measured by detecting the relative vertical displacement of the bottom surface of the upper plunger 186 with respect to the top surface of the sintering mold. The detection may be achieved by using a suitable sensor, such as a touch sensor. The sinkage produced by the pressing operation is much less than the thickness of any powder layer which may be possibly formed next in the sintering mold. Therefore, if another powder layer is to be formed on the layer of the powder compact, the powder compact has to be displaced downward relative to the sintering mold in order to allow for the powder filling operation for the next powder layer (the sinkage produced by compaction of the powder compact plus the subsequent downward displacement of the powder compact relative to the sintering mold will be equal to the thickness of the next powder layer). Thus, with the lower press core and the powder compact being kept pressed between the pedestal 183 and the upper plunger 186, the lift cylinders 188 are operated to extrude their piston rods 188a upward, with the result that the support members 190 attached to the upper ends of the piston rods 188a come into engagement with the receiving plate 230 of the carrier 223 so as to lift up the receiving plate 230. Simultaneously, the hydraulic cylinder 187 is operated to lift up the upper plunger 186 at the same rate as the receiving plate 230, so that the powder compact is kept pressed. Further, at the same time, the lift motor 239 is operated in direction to lift up the receiving plate 230 (the push-up member 234 is lifted up together with the receiving plate 230). The operations above continue until the receiving plate 230 of the carrier 233 is lifted up to reach the level at which the receiving plate 230 is maintained during conveyance of a sintering mold. When the level is reached, the upper plunger 186 and the push-up member 234 are now displaced downward relative to the sintering mold, with the powder compact being kept pressed therebetween, until the amount of the downward displacement of the push-up member 234 reaches the desired amount (which depends on the selected amount of powder material to be filled for the next powder layer). In this manner, the powder compact is displaced downward relative to the sintering mold al. The amount of the downward displacement

of the powder compact can be detected by measuring the displacement of the push-up member 234. In the case where the powder compact to be formed is a non-multi-layered powder compact so that only a single powder layer needs to be formed in the sintering mold (such a powder layer usually has a greater thickness than any powder layer in a multi-layered powder compact), the amount of the upward displacement of the tray and the sintering mold thereon is controlled such that the vertical position of the powder compact relative to the sintering mold will be the most suitable position for the sintering operation subsequently performed. In order to perform another powder filling operation for the next powder layer following the powder filling and pressing operations for the previous powder layer, the push-up member 234 is displaced downward relative to the receiving plate 230 by the distance corresponding to the thickness of the next powder layer. (However, the pushup member 234 may be further lowered to the waiting position if the under press core need not be supported during the next powder filling operation.) Also, in the case where the powder compact to be formed is a multi-layered powder compact so that a plurality of powder layers need to be formed in the sintering mold, following the powder filling and pressing operations for the last powder layer, the amount of the upward displacement of the tray and the sintering mold thereon is controlled such that the vertical position of the powder compact relative to the sintering mold will be the most suitable position for the sintering operation subsequently performed. It is noted that the fit of the upper plunger 186 in the bore of the sintering mold is a tight fit (in order to prevent escape of any powder which could otherwise occur through a clearance between the bore and the upper plunger [187] 186), the upper plunger 186 tends to drag upward the sintering mold when lifted up for removal from the sintering mold. In order to prevent the drag of the sintering mold by the upper plunger 186, a clamping mechanism (not shown) is provided on the press unit 18 for clamping the sintering mold when the upper plunger 186 is lifted up for removal from the sintering mold.

On page 31,The first full paragraph has been changed as follows:

With reference to Figs. 14 and 15, the take-out unit 20 serves to sequentially pick up from the carrier 223 trays with sintering molds having been subjected to the pressing operation in the press unit 18 and send them to the next process station. The [sender] take-out unit 20 comprises an elevator 200 having a construction similar to the elevator 120 of the sintering mold dispenser

unit 12; therefore, like parts and elements are designated by like reference numerals and not described in detail for simplicity. A primary difference between the elevator 200 of the take-out unit 20 and the elevator 120 of the sintering mold dispenser unit 12 resides in that the latter serves to sequentially lift down trays with sintering molds placed thereon (i.e., sintering-mold-and-trays) and dispense them onto the carrier 233, while the former serves to sequentially pick up or take out sintering-mold-and-trays from the carrier 223 and lift up them to a conveyor line. The take-out unit 20 further comprises a first transfer mechanism 201 for transferring a sintering-mold-and-tray from the carrier [233] 223 to the elevator 200 and a second transfer mechanism 210 for transferring a sintering-mold-and-tray from the elevator 200 to the conveyor line for conveying them to the next process station.

The paragraph bridging pages 32 and 33 has been changed as follows:

The second transfer mechanism 210 comprises a launcher cylinder (a hydraulic cylinder serving as an actuator) 211 for launching a lifted-up tray from the uppermost position in the elevator 200 onto the conveyor line. In operation, when the carrier 223 carrying a tray has reached the take-out unit 20, the lift cylinder 207 is operated to lift up the tray. Then, the hydraulic cylinder 205 is operated to move the pushing cross bar [26] 206 from the right to the left in Fig. 14, so that the tray is moved by the pushing cross bar 206 to the position at which the tray, having a sintering mold placed thereon, is loaded on the support bars 128 of the elevator 200. The tray thus loaded on the support bars 128 is lifted up by the elevator 200 to the uppermost position in the elevator 200, and then pushed out of the elevator 200 to the left in Fig. 14 and launched onto the conveyor line by the launcher cylinder 211.

The paragraph bridging pages 33 and 34 has been changed as follows:

Sintering molds a1 are individually placed on associated trays J during transportation through the apparatus 10. As described, the trays J have an opening H formed therein. When the sintering mold dispenser unit 12 has dispensed onto the carrier 223 a tray J having a sintering [molds] mold a1 placed thereon, the carrier 233 is operated to move sequentially to the selected ones of the powder filling mechanisms 14 in the order appropriate for forming the plurality of powder layers in the sintering mold. When the carrier 223 is moved to the first of the selected powder filling mechanisms (typically, the carrier 223 is moved first to the powder filling

mechanism located at the position A or position K), it is stopped under that powder filling mechanism and then positioned to the powder filling position of that mechanism with precision. Then, the receiving plate 230 is lifted up to raise the sintering mold al with the tray J to a predetermined level, at which the upper end of the sintering mold al is received in the opening 141a of the support plate 141 of the powder filling mechanism. At the same time, the push-up member 234 is lifted up a predetermined distance relative to the receiving plate 230 so as to raise the lower press core e to such a level that is appropriate for the filling of a desired amount of powder material into the sintering mold for the first powder layer. Then, the powder filling mechanism is operated in the manner described above so that the desired amount of powder material is filled into the bore of the sintering mold al. When the powder filling operation has been done, the sintering mold is transported by the carrier 223 to the pressing position of the press unit 18, which then serves to press at a desired pressure the amount of powder material in the sintering mold, so as to form a pre-compressed powder compact. If another powder filling operation has to be carried out for the next powder layer to be formed in the sintering mold, either the sintering mold is displaced upward relative to the powder compact or the powder compact is displaced downward relative to the sintering mold while the powder compact is kept pressed, such that the vertical position of the powder compact within the sintering mold is adjusted to such a position that is appropriate for the filling of a desired amount of powder material into the sintering mold for the next powder layer. Then, the press unit 18 releases the sintering mold al, and the carrier 223 transports the sintering mold al to the measuring position of the measure unit 16, at which the weight of the powder material in the sintering mold is measured in the manner described above.

Page 38, the 1st full paragraph has been changed as follows:

With reference to Fig. 17, the lift/support unit 25A comprises: a base plate [251] 251A; a plurality of vertical guide rods 252A fixedly mounted on the base plate [251] 251A; a lift bed 253A guided by the vertical guide rods 252A and driven by a feed screw mechanism of a known type (not shown) for vertical displacement; a vertical screw spindle 254A supported by the lift bed 253A and driven by a drive motor (an electric motor) 256A of a known type; and a lower plunger 255A guided by the lift bed 253A for vertical displacement. The lower plunger 255A is

received in a center hole formed in the upper end of the lift bed 253A and is capable of projecting upward from the top surface of the lift bed 253A. The lower plunger 255A has a vertical threaded hole extending therethrough, with which the vertical screw spindle 254A is in thread engagement, so that by rotation of the screw spindle 254A the lower plunger 255A is lifted up/down relative to the lift bed 253A. The lower plunger 255A, when lifted up, enters in the opening l4laA of the support plate 141A of the powder filling mechanism 14A so as to push up the lower press core e fitted in the sintering mold. The upper end of the lift bed 253A is capable of engaging with the bottom of a tray so as to lift up the tray.

Page 41, the 1st full paragraph has been changed as follows:

The movable base plate 224B has five stop mechanisms 270B one of each of the five openings 226aB, for limiting upward displacement of a sintering mold al' placed on the movable base plate 224B. Each stop mechanism 270B comprises: a pair of support blocks 271B provided on opposite sides of the opening [225B] 226aB and fixedly mounted on the base plate 224B; a pair of engagement pins 272B each provided on the top of the associated one of the support blocks 271B and having a stem and a flat, enlarged head; and a stop member 273B capable of placement on and attachment to the tops of the support blocks 271B. The stop member 273B has a central opening 274B for receiving the upper portion of a sintering mold al' and a pair of recesses 275B for receiving the stems of the engagement pins 272B. The stop mechanisms 270B is adapted for a manual setting. After a sintering mold al' is placed in position on the movable base plate, the stop member 273B is placed on the tops of the support blocks 271B as shown by imaginary lines in Fig. 22, and then rotated in clockwise direction as viewed in Fig. 22 so that the stems of the engagement pins 272B are received in the recesses 275B. In this manner, setting of the stop mechanism 270B is completed. This setting may be manually performed.

IN THE CLAIMS:

The claims have been amended as follows:

11. (Amended) An apparatus for automatically loading a desired amount of powder material into a tubular mold having a bore extending therethrough, said apparatus comprising:

a mold conveyor system for supporting and conveying said mold with a lower press core fitted in said bore;

a powder filling mechanism for filling an amount of powder material into said mold, said powder filling mechanism being located at a powder filing position defined along a transportation path of said mold conveyed by said mold conveyor system; and

a press unit for pressing at a desired pressure the amount of powder material in said mold to form a powder compact,

wherein the mold in which the desired amount of powder compact is loaded is conveyed out of the powder filling position and a new mold with no powder material being loaded is conveyed to the powder filling position.

16. (Amended) An apparatus for automatically loading a desired amount of powder material into a mold according to claim 11, further comprising:

a measure unit for measuring the weight of said [sintering] mold with the amount of powder material filled into said mold, so as to measure the weight of the amount of powder material filled into said mold.

17. (Amended) An apparatus for automatically loading a desired amount of powder material into a mold according to claim 11, wherein said powder filling mechanism has a single powder filling position and wherein:

a) said powder filling mechanism comprises:

at least one hopper movable to and from said single powder filling position and adapted to store an amount of powder material therein; and

a strickle mechanism for strickling off any excessive amount of powder material, being filled into said mold from said hopper to the level of [said] a top surface of said mold; and

b) said press unit comprises

a lower press member located at said powder filling position, for pressing upward said lower press core fitted in said mold; and

an upper press member for pressing downward the amount of powder material in said mold.

19. (Amended) An apparatus for automatically loading a desired amount of powder material into a mold according to claim 17, wherein;

said powder filling mechanism further comprises a rotary table capable of indexing movement;

said at least one hopper is movable relative to said mold held at said powder filling position and movable on a plane of said top surface of said mold held at said powder filling position;

said at least one hopper forms a part of said strickle mechanism;

said at least one hopper comprises a plurality of hoppers provided on said rotary table at circumferentially spaced positions with respect to the axis of said rotary table, said plurality of hoppers being capable of individual movement; and

different powder material are stored in said plurality of hoppers, respectively, differing from one another in at least one of properties including component(s) of powder material, percentages of components, particle size and particle shape.

20. (Amended) A powder filling mechanism for filling powder material into a mold which has a bore opening at a top end thereof, said mechanism comprising:

a support plate having a top surface and a hole sized to receive [for receiving] said upper end of said mold, wherein said upper end of said mold [may be fitted] is capable of fitting in said hole without any substantial clearance therebetween and with said top surface of said support plate and a top surface of said mold being substantially flush with each other;

a hopper having a bottom surface and so disposed as to be movable on said top surface of said support plate with said bottom surface being in contact with said top surface of said support plate, said hopper having an amount of powder material stored therein; and

said hopper having a bottom opening for dispensing powder material, which opens at said bottom surface and has a size equal to or greater than that of a top opening of said bore of said

mold, wherein said hopper is movable on said top surface of said support plate and across said top surface of said mold.

22. (Amended) A powder filling mechanism [according to claim 20], for filling powder material into a mold which has a bore opening at a top end thereof, said mechanism comprising:

a support plate having a top surface and a hole for receiving said upper end of said mold, wherein said upper end of said mold may be fitted in said hole without any substantial clearance therebetween and with said top surface of said support plate and a top surface of said mold being substantially flush with each other;

a hopper having a bottom surface and so disposed as to be movable on said top surface of said support plate with said bottom surface being in contact with said top surface of said support plate, said hopper having an amount of powder material stored therein; and

said hopper having a bottom opening for dispensing powder material, which opens at said bottom surface and has a size equal to or greater than that of a top opening of said bore of said mold, wherein said hopper is movable on said top surface of said support plate and across said top surface of said mold,

wherein [:] said hopper is movable along a straight path between first and third positions at which said bottom opening of said hopper is closed by said support plate, wherein said hopper passes by a second position during a stroke between said first and third positions, at which said bottom opening of said hopper is in alignment with said hole in said support plate, whereby powder filling is completed by a single stroke of said hopper from one of said first and third positions to the other.